

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
31 May 2001 (31.05.2001)

PCT

(10) International Publication Number
WO 01/39193 A1

(51) International Patent Classification⁷: G11B 33/04

[GB/CN]; 13A, Sze Hing Loong Industrial Building, 44 Lee Chung Street, Chai Wan, Hong Kong SAR (CN).

(21) International Application Number: PCT/IB00/01690

(22) International Filing Date:
17 November 2000 (17.11.2000)

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(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
09/449,734 26 November 1999 (26.11.1999) US

(81) Designated States (*national*): AE, AG, AL, AM, AT, AT (utility model), AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, CZ (utility model), DE, DE (utility model), DK, DK (utility model), DM, DZ, EE, EE (utility model), ES, FI, FI (utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KR (utility model), KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (utility model), SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

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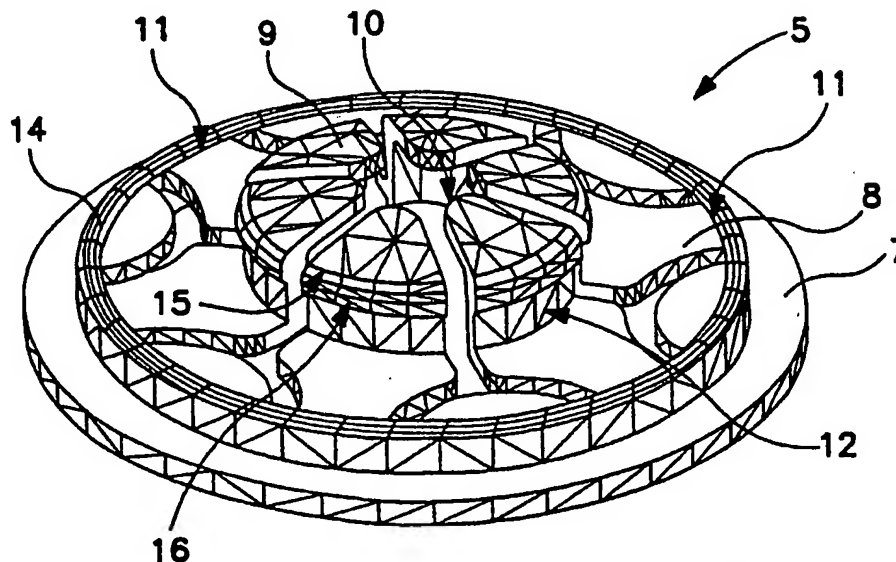
(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

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[Continued on next page]

(54) Title: COMPACT DISC CONTAINER



(57) Abstract: This invention provides an apparatus or container for a compact disc having a central holding portion to retain the disc through a central aperture. The central holding portion has a plurality of inwardly directed radial arms that are depressible towards their inner ends. Each arm includes a raised mid section which includes a rib, lip or similar to engage over the disc. Also, a bearing means bears on the underside of the disc around the central aperture on the non-data carrying portion of the disc adjacent that aperture. The disc is firmly supported between these two points of contact.

WO 01/39193 A1



Published:

— With international search report.

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

COMPACT DISC CONTAINER**Field of the Invention**

This invention relates to a compact disc container for audio, video or digital video discs.

5 Background of the prior art

Numerous compact disc containers have been manufactured to date. The general structure of such containers involves an outer plastic container and a tray or base portion in which the disc sits.

- 10 The discs themselves are provided with a central aperture and it is through this aperture that a variety of rosettes have been used to contain the disc in place.

The difficulty in such rosettes is providing an ease of removal of the compact disc. Again, a variety of mechanisms have been used for this purpose with one such example
15 being in US patent No. 5,788,068. In that device, inwardly directed radial arms form a button at their inner ends. The outer circumference of the button has a lip or similar projection over which the compact disc may be pressed to be retained in place. As the button is pressed, the radial arms move downward and inward to reduce the diameter of the button and thereby release the disc.

20

The apparatus as described in US 5,788,068 relies on flexure of the disc to facilitate the removal operation. The lips on the button retaining the disc deform the disc towards the base until the diameter has reduced sufficiently to allow the disc to release. Although this flexure of the disc acts to pop the disc to the top of the button, such treatment of the disc
25 may be detrimental over time.

Generally items similar to that described in US patent 5,788,068 rely on some restraint against downward movement of the outer edges of the disc so the disc is flexed between the outer edge and the central aperture. Although there is a relatively clear area adjacent
30 the central aperture which does not contain machine readable information, such information is contained towards the outer edges of the disc and there is a risk of scratching or damage to the disc adjacent those outer edges in these constructions. Fig.

10 of US 5,788,068 shows angular walls around the outer circumference which act to engage that outer edge of the disc.

5 A further form of compact disc container is described in US patent No. 4,874,085. In this container, the disc is supported on the area adjacent the central opening through the disc. Furthermore, there is no peripheral contact with the disc to avoid even the outer edges of the disc becoming marked by contact with the container.

10 Out of the disadvantages with the items disclosed in US 4,874,085 is that there is no easy means to urge the disc from its connection with the central holding portion. For example, as shown in Fig. 9 of that patent, upright fingers are provided to retain the disc on the planar surface beneath and these fingers are only capable of radially inward movement. The disc must be pulled from these fingers rather than there be any downward motion of the fingers that may allow the disc to be urged to the top of those fingers unless the entire
15 base unit is flexed. When the base resides on a hard surface such as a table top or similar, it is not possible to move those fingers in a downward direction and instead the disc must be pulled upward over the retaining portions.

20 A yet further compact disc container is described in US patent No. 5,526,926. In this patent, the central holding portion includes actuatable spring-catches. The spring-catches have a radially outwardly extending portion that rises upon depression of the central holding portion to assist in urging the disc out of contact.

25 The apparatus as described in US 5,526,926 suffers from many disadvantages including the difficulty in retaining consistent movement in the spring-catches after many uses. The spring-catches are supported on a small pivot beneath the catch and do not provide a strong contact with the disc. As such, a disc can be easily dislodged from the central holding portion, particularly if the container is dropped. The spring-catches are also relatively difficult and expensive to manufacture.

30 Another difficulty with many of the arrangements is that the container, when accidentally dropped, releases the disc which may then move around inside the container and create significant damage to the disc. This is particularly the case with arrangements which rely

on flexure of the disc for release as dropping of the container may just cause such flexure across the disc and depression of the relevant portions.

Object of the Invention

- 5 It is an object of the present invention to provide a compact disc container which overcomes some of the problems of the prior art or at least provides the public with a useful choice.

Summary of the Invention

10

Accordingly, in the first aspect, the invention may be said to consist in an apparatus for holding a compact disc having a central aperture comprising:

- a substantially planar base portion;
- a central holding portion to retain said disc substantially parallel to and separated
15 from said base portion;
- said central holding portion including a plurality of radial members forming a depressible portion with their inner ends and fixed with relation to the base portion at an outer radial end;
- said radial members including a raised portion intermediate of the ends that is
20 generally transverse to the plane of the base member;
- an upper edge of or outward projections on said raised portions forming a ring of greater circumference than the circumference of said central aperture of said disc to retain said disc once said disc is fitted over said upper edge;
- said circumference of said ring being reduced by depression of said depressible
25 portion formed by the inner ends of said radial members such that, when depressed, the disc may release over said ring; and
- a bearing means about said central holding portion to reside against an inner non-data contains underside portion of said disc when said disc is retained by said
30 central holding portion.

Brief Description of the Drawings

Preferred embodiments of this invention will now be described with reference to the following drawings in which:

- Fig. 1 shows a perspective view of one embodiment of the apparatus in a closed condition;
- Fig. 2 shows a perspective view of the apparatus of Fig. 1 in an open configuration;
- 5 - Fig. 3 shows a perspective view of a central holding portion in accordance with one embodiment of the apparatus;
- Fig. 4 shows a cross-sectional view through the central holding portion of Fig. 3;
- Fig. 5 shows a perspective view of an alternative central holding portion;
- Fig. 6 shows a cross-sectional view through the central holding portion of Fig. 5;
- 10 - Fig. 7 shows a perspective view of a yet further central holding portion;
- Fig. 8 shows a cross-sectional view through the central holding portion of Fig. 7;
- Fig. 9 shows a cross-sectional view through one embodiment of the apparatus with a compact disc in place and retained by said central holding portion;
- Fig. 10 shows a cross-sectional view of the apparatus of Fig. 9 as the compact disc is being released; and
- 15 - Fig. 11 shows a cross-sectional view through the apparatus of Figs. 9 and 10 with the compact disc now released.

Detailed Description of Preferred Embodiments

- 20 Referring to the drawings, this invention can be seen to reside in a compact disc container or apparatus for holding a compact disc 1. Typically, such apparatus is provided with an outer case 2 which is often formed into a book-like case having a spine 3 which acts as a hinge for a top and bottom cover of the container 1.
- 25 Referring to Fig. 2, the apparatus or container 1 is shown in an open configuration. The top cover 2 is rotated to the open position about the spine 3 and the bottom cover 4 is shown to contain a central holding portion 5. Additional features may be provided in the container such as retaining means 6 to retain a booklet or other printed information relating to the compact disc held in the container.

30

Referring to Fig. 2, the central holding portion 5 can be seen to be raised with respect to a surrounding base portion 7 and the central holding portion 5 is intended to secure a compact disc through the central aperture provided in such a disc.

- 5 The central holding portion 5 will now be described in more detail with a first embodiment shown in Fig. 3.

The central holding portion 5 can be seen to include a plurality of inwardly radial portions or members 8. These radial portions have an inner end 9 which, cooperatively, form a
10 depressible portion 10 formed by the inner ends 9.

Each of the radial members 8 contribute to form the depressible portion 10 by having a free end at the inner end 9. Although the preferred embodiments describe these as free ends of each of the radial members 8, it should be appreciated that some form of integral
15 joint between them is possible provided such an integral joint or other connection between each of the free ends 9 does not inhibit the ability of these ends 9 to be depressed and move inwardly and downwardly as they do so.

Each of the radial members 8 are substantially fixed at the outer ends 11 and upon
20 pressure being applied to the free ends 9, each of the radial members 8 formed from a material suitable to allow some flexure of the member 8 about its substantially fixed end 11.

Intermediate of the fixed end 11 and the free end 9 on each radial member 8, there is a
25 raised portion 12 that is substantially transverse to the plane of the surrounding base member 7. This raised portion 12 provides a step in the radial arm 8 between the fixed end 11 and the inner end 9 such that the inner end 9 is raised above the end portion of the radial member 8 progressing towards the fixed end 11.

30 Also shown in Fig. 3, a bearing means 14 is provided around the central holding portion 5. The bearing means 14 is intended to bear on the underside of the compact disc retained on the central holding portion 5. The size of the central aperture in a compact disc is relatively standard allowing the size of the central portion 5 to be accurately determined and the bearing means 14 is intended to bear on the compact disc around the central

aperture. There is a significant portion of non-data carrying space on a compact disc from the central aperture and radially outward therefrom. The majority of data carrying area is closer to the outer edges of a compact disc in most cases.

- 5 The bearing means 14 is intended to bear a non-data carrying portion adjacent the central aperture.

As shown in this example the bearing means 14 is a continuous concentric ring around the central holding portion. Of course, such a bearing means 14 does not need to be
10 circular in plan view around the central axis of the holding portion 5 although this is preferred. Similarly, it does not need to be continuous and may be provided by intermittent portions if desired. It is preferable that at least sufficient portions are provided to support the disc and, for example, three or four discreet points around the central holding portion 5.

15

Referring to Fig. 4, the central holding portion 5 is shown in cross section.

It can be seen that the raised portion 12 terminates in an upper edge 15 before progressing further inwardly towards the inner end 9. This upper edge 15 around the radial members
20 8 is sized to a dimension slightly larger than the dimension of the inner aperture of a compact disc. A standard compact disc has a central aperture of approximately 15 mm. diameter and it is intended that the compact disc needs to be pushed over the upper edge 15 to reside in place. As some inward movement is accommodated by the radial arms 8 as the inner ends 9 can move towards each other, a compact disc can simply be pushed
25 over the upper edge 15 as each radial member relaxes to its normal state, the slightly greater diameter of the upper edge 15 retains the compact disc.

Although the slightly increased diameter of the upper edge 15 can be provided by a slight outward angle to the raised portion 12, it is preferred that a lip 16 is provided around the
30 upper edge 15 and the base portion 12 is substantially transverse to the base portion 7 in its normal configuration.

The construction of each of the radial arms 8 can be more clearly seen in cross section to comprise a first end portion 17 progressing from the free end 9 towards the raised portion

12. The raised portion 12 forms a mid section of the arm 8. The remainder is a third portion 18 which is adjacent the fixed end 11 of the arm 8.

As it is intended that the compact disc is retained under the lip or rib 16 and bear on the bearing means 14 but not contact the remainder of the arm 8, the third portion 18 is substantially transverse to the base member 7 or may even progress at a slight downward angle from its fixed end 11 towards the mid section 12. The mid section 12 is substantially transverse to the base member 7. The first portion 17 is less restricted in form as it is within the central aperture of the compact disc so is not constrained as much in its configuration. As shown in this embodiment, this portion raises slightly towards the free end 9 to provide a slightly raised depressible button-like member in cooperation with the other free ends 9.

To retain the compact disc under the lip or rib 16, a variety of surfaces 19 may be used on the underside of the lip or rib 16. In this example, an angled face 19 is provided against which the upper edge of the central aperture of the compact disc may reside. This angled face is preferred at an angle of between 10 and 30 degree to the base member 7 and configured such that the higher edge of the face 19 is at the outward radial edge of the face 19 from the central axis 20.

20

A further embodiment of the central holding portion 5 is shown in Figs. 5 and 6.

In this embodiment, the construction as shown in Fig. 5 is substantially the same as that of the previous embodiment. Again the plurality of members 8 are provided with a fixed end 11, a free end 9 and a substantially transverse mid section 12 to form a step in the radial member 8.

The difference between this embodiment and the previous embodiment is shown more clearly in Fig. 6. The difference resides in the formation of the lip or rib 16 around the upper edge 15. In this embodiment, rounded upper and lower portions of the lip 16 are provided rather than the angled face 19 as previously described. The radiused corners may be, for example, a 1 mm. radius corner on the upper corner 22 and a sharper radius such as 0.5 mm. for the lower corner 21.

All the previous embodiments may provide a portion of the member 8 of reduced thickness such as that portion 23 shown in Fig. 6. This portion of reduced thickness is provided to increase the flexibility of the members 8 and is positioned adjacent the fixed end 11.

5

As shown in these preferred embodiments, the reduction of thickness of the member 8 adjacent the fixed end 11 may be provided by grooves on either side of the member 8 although, alternatively, can be obtained by a single groove or reduction to one side only.

10 Fig. 6 also shows the fixing of the members 8 at a point above the plane of the base member 7. The members 8 are fixed at the fixed end 11 to a surrounding upstanding wall 24, the top of which also provides the bearing means 14. This is done for simplicity although the bearing means 14 could be provided separately if desired. By fixing the member 8 above the plane of the base member 7, there is ample space beneath the
15 member 8 to accommodate depression of the inner end 9 and rotation of the member 8 about the fixed end 11. Should the container be placed on a hard surface underneath the bottom cover 4, it is necessary to accommodate an area for downward movement of the radial members 8 and this is done in this preferred embodiment by fixing the members 8 above the plane of the base 7.

20

A yet further embodiment of the central holding portion 5 is shown in Figs. 7 and 8. In this embodiment, the rib or lip at the top of the raised portion 12 is provided by an outward projection 27. This projection need not extend over the entire length of the upper edge 15 of the member 8.

25

To assist in the formation of the projection 27 and increase the distance that it may project, an aperture 26 may be provided beneath the projection 27. This aperture 26 may facilitate the introduction of a face in the tool used to manufacture such products to form the underside face 19 as shown in Fig. 8 and improve the formation of the projection 27.

30

The operation of such a container 1 will now be described with reference to the sequential Figs. 9 to 11.

Referring to Fig. 9, the central portion 5 can be seen to hold a compact disc 30 so that it is retained underneath the lip or rib 16 and bears upon the bearing means 14. The disc 30 is otherwise separated from the base 7.

- 5 Upon application the downward force as indicated by arrow 31 onto the inner ends 9 of the members 8, the members 8 will rotate inwards and downwards about the fixed end 11. Although there may be a tendency for the disc 30 to be flexed or otherwise moved towards the base 7, the bearing means 14 inhibits such movement and allows the members 8 to press past the inner edge 32 of the central aperture in the disc 30.

10

Having pressed past the edge 32, the force 31 may be released and the natural resilience of the members 8 may lift the disc 30 as the central portion 5 rises as indicated by arrow 33. The disc 30 is now held on top of the lips or ribs 16.

- 15 Referring again to Fig. 2, it can be seen that a peripheral support 34 may be provided around the disc. However, as the retaining and releasing action of the disc 30 does not involve support of the disc 30 about its outer edges, the peripheral portion 34 may be provided purely to assist in supporting the disc in plane with the base 7. It can provide lateral support although there is no need for it to provide support of the disc against the downward pressure as shown by arrow 31 in Fig. 9. The peripheral portion 34 can bear against only the outer edge of the disc and does not need to contact the underside of the disc at all if desired. In an alternative embodiment, the outer support 34 can be dispensed with entirely.

- 20
25 If an outer support 34 is to be provided as shown in Fig. 2, there may be recesses 35 about this peripheral support to allow finger access to the edge of the disc to assist in lifting the disc once released by the central portion 9.

- 30 In manufacturing such items, a variety of materials could be used. It is typical that such containers are made from plastics material and generally injection molded or otherwise formed as a single item. In this manner, it may be desirable to utilize a single material for the entire item. The material chosen needs to provide some flexibility or elasticity to the members 8 so that they may deform as shown particularly in Fig. 8.

Thus it will be appreciated that the present invention allows the disc to be retained on the central holding portion 5 with the disc held between the lip or rib on the arms 8 and the bearing means underneath being the substantially concentric ring 14. The use of a concentric ring 14 also provides a point of connection for the radial members 8 elevated
5 from the base 7 to accommodate the downward movement of those arms.

Although the invention has been described with reference to particular embodiments, it will be appreciated that the invention is not restricted to those embodiments but instead defined by the appended claims. Specific integers referred to throughout the description
10 are deemed to incorporate known equivalence where appropriate and references to the singular may include the plural.

CLAIMS:

1. An apparatus for holding a compact disc having a central aperture comprising:
 - a substantially planar base portion;
 - a central holding portion to retain said disc substantially parallel to and
5 separated from said base portion;
 - said central holding portion including a plurality of radial members forming a depressible portion with their inner ends and fixed with relation to the base portion at an outer radial end;
 - said radial members including a raised portion intermediate of the ends that
10 is generally transverse to the plan of the base member;
 - an upper edge of or outward projection on said raised portions forming a ring of greater circumference than the circumference of said central aperture of said disc to retain said disc once said disc is vetted over said upper edge;
 - 15 - said circumference of said ring being reduced by depression of said depressible portion formed with the inner ends of said radial members such that, when depressed, the disc may release over said ring; and
 - a bearing means about said central holding portion to reside against an inner non-data cone underside portion of said disc when said disc is
20 retained by said central holding portion.
2. An apparatus for holding a compact disc as claimed in claim 1 wherein said bearing means comprises a substantial circular upstand generally transverse to the
25 plane of the base member and substantially concentric about said central holding portion.
3. An apparatus for holding a compact disc as claimed in claim 2 wherein said radial members are fixed at their outer radial ends to and inner wall of said upstand.
- 30 4. An apparatus as claimed in claim 3 wherein said fixed ends of said radial members are fixed to said inner wall of said upstand at a point above the plane of said base member.

5. An apparatus for holding a compact disc as claimed in claim 1 wherein said ring formed by an upper edge of or outward projection on said raised portions is formed by an outward projection adjacent an upper edge of said raised portions.
- 5 6. An apparatus for holding a compact disc as claimed in claim 5 wherein an underside of said outward projection against which an upper inner edge of said compact disc may reside is provided as an angled face having an outer edge higher from said base member than an inner edge.
- 10 7. An apparatus for holding a compact disc as claimed in claim 6 wherein an angled face is provided at an angle fall between 10 to 30 degrees from the plane of said base member.

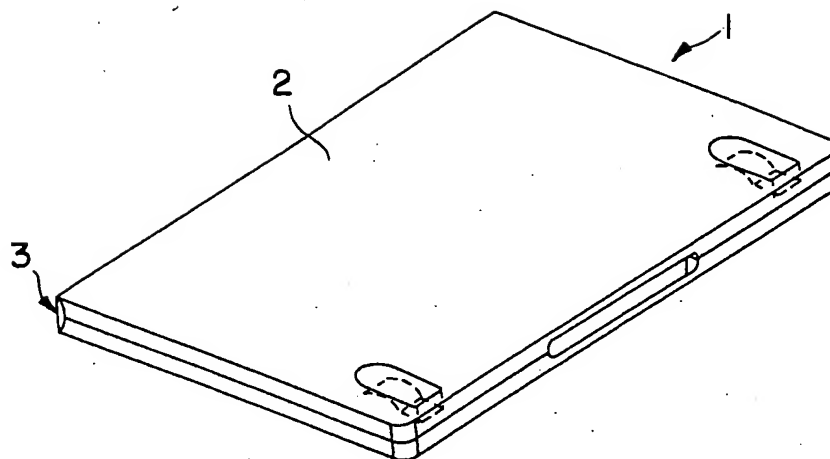


FIG. 1

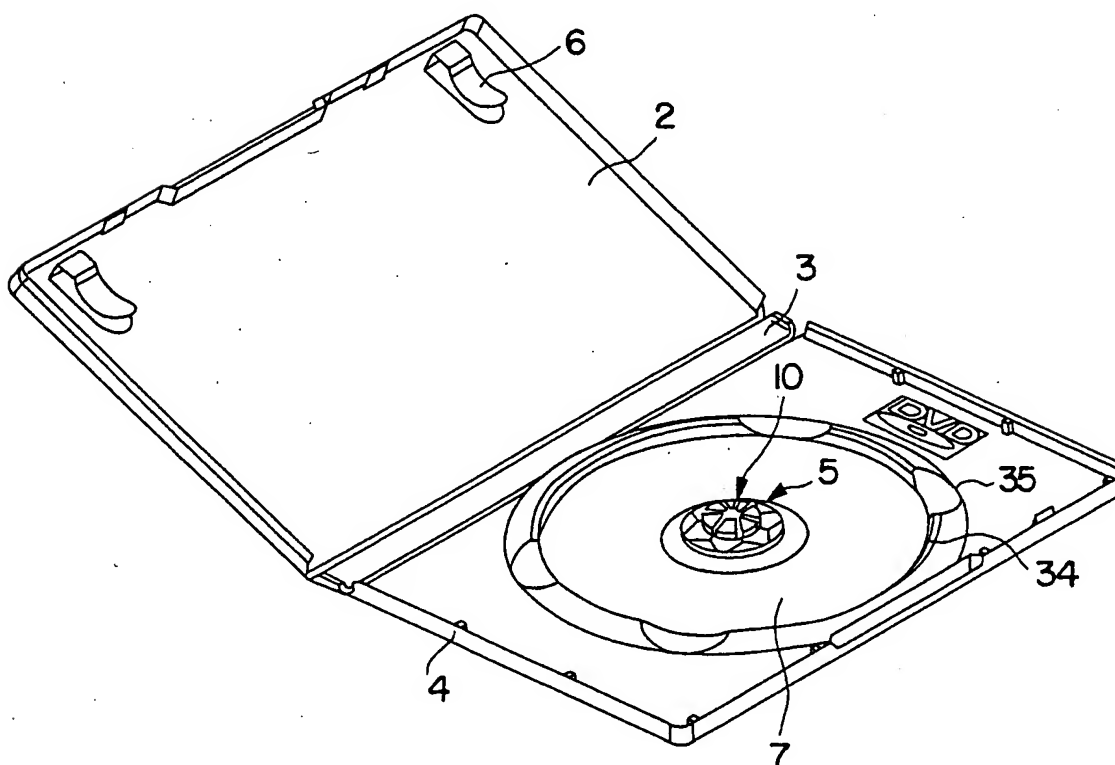


FIG. 2

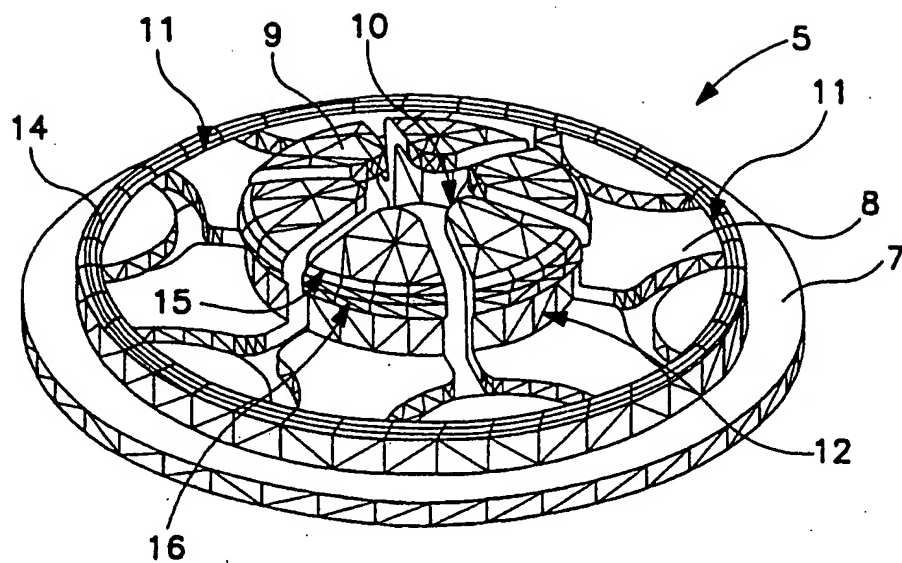


FIG. 3

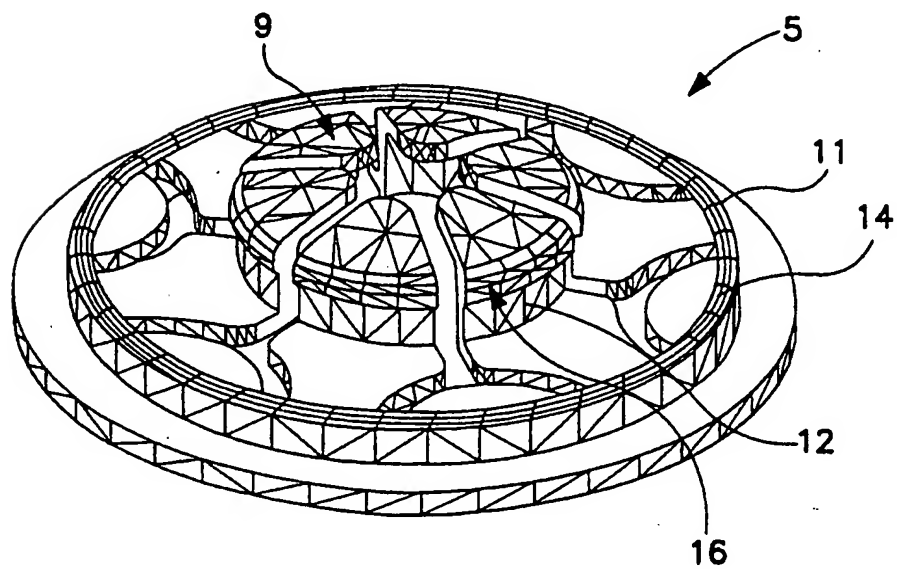


FIG. 5

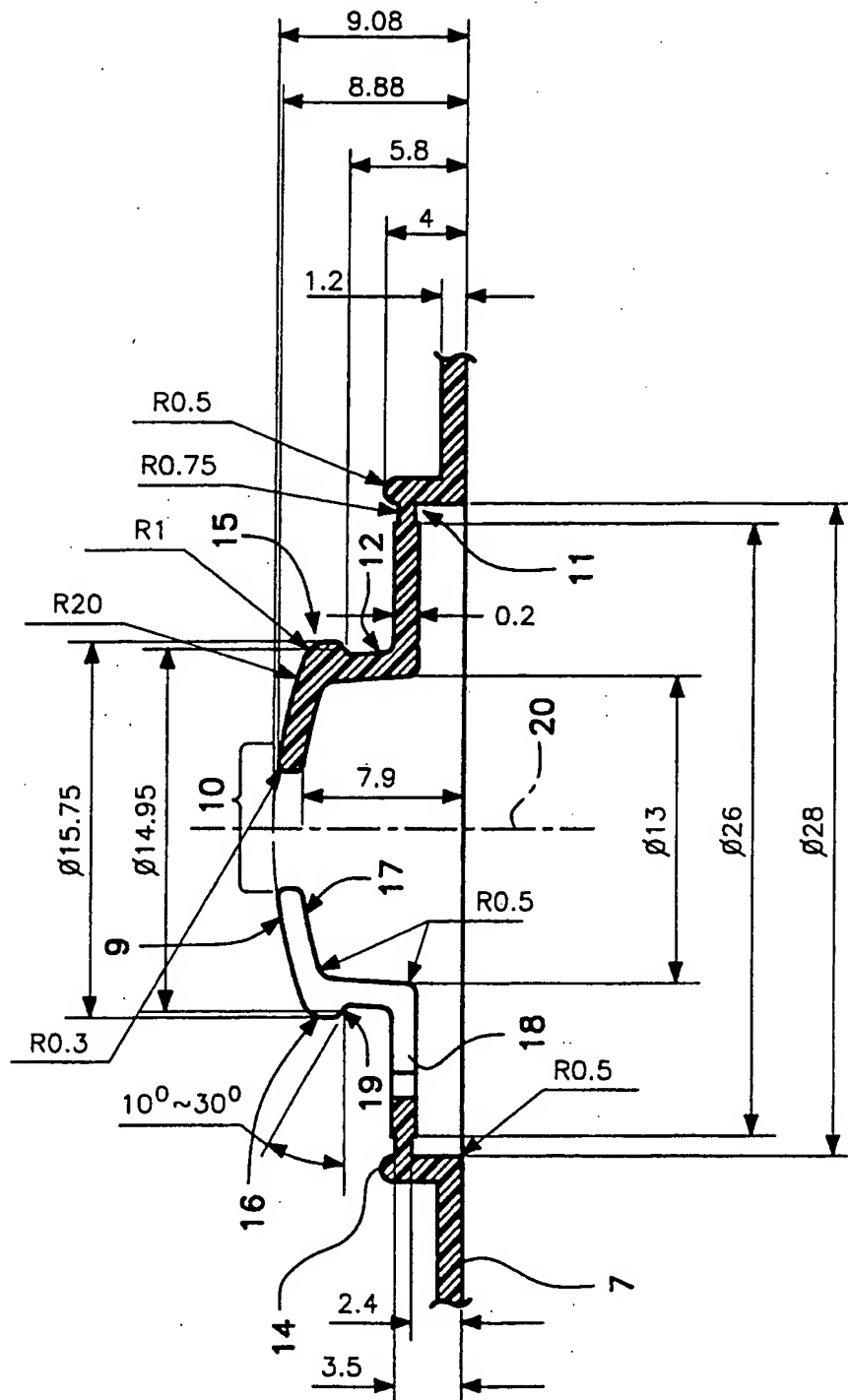


FIG. 4

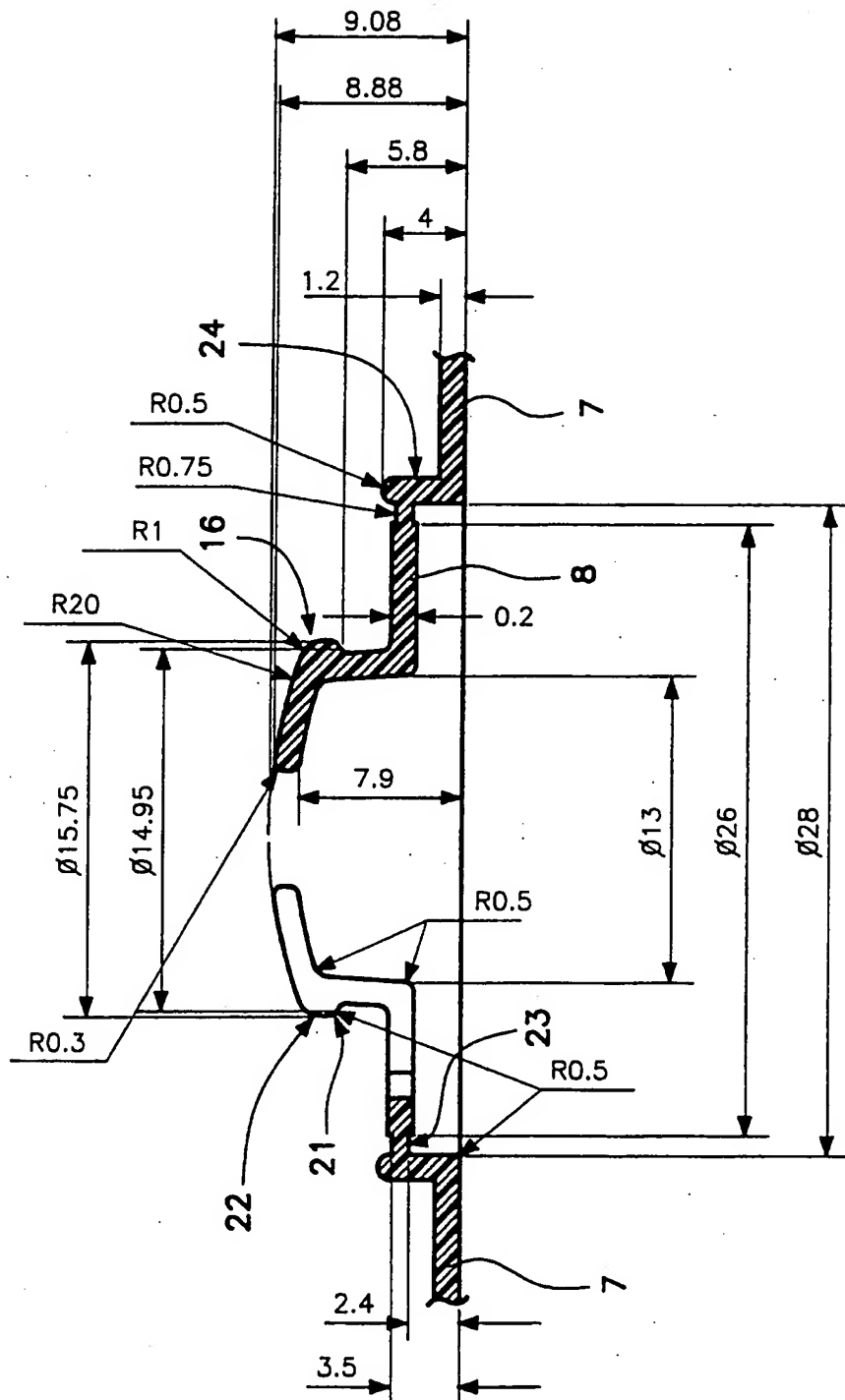


FIG. 6

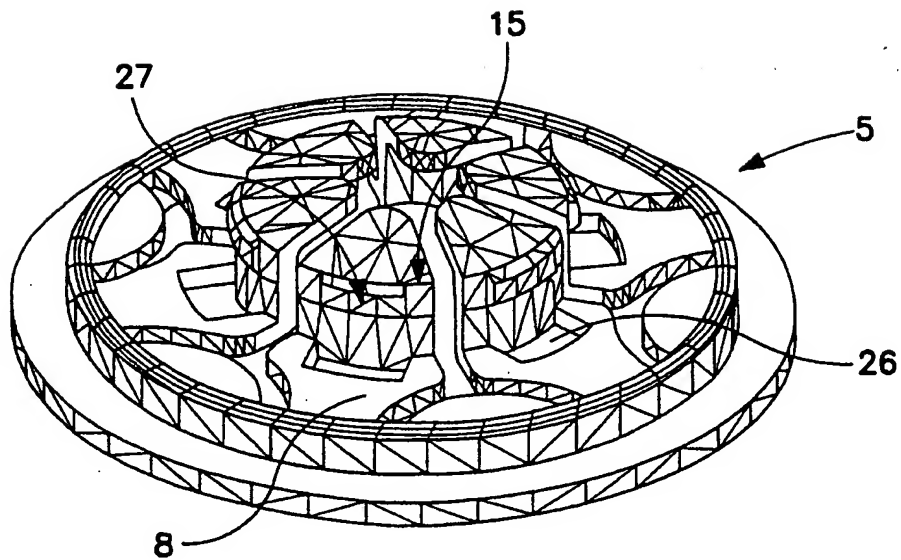


FIG. 7

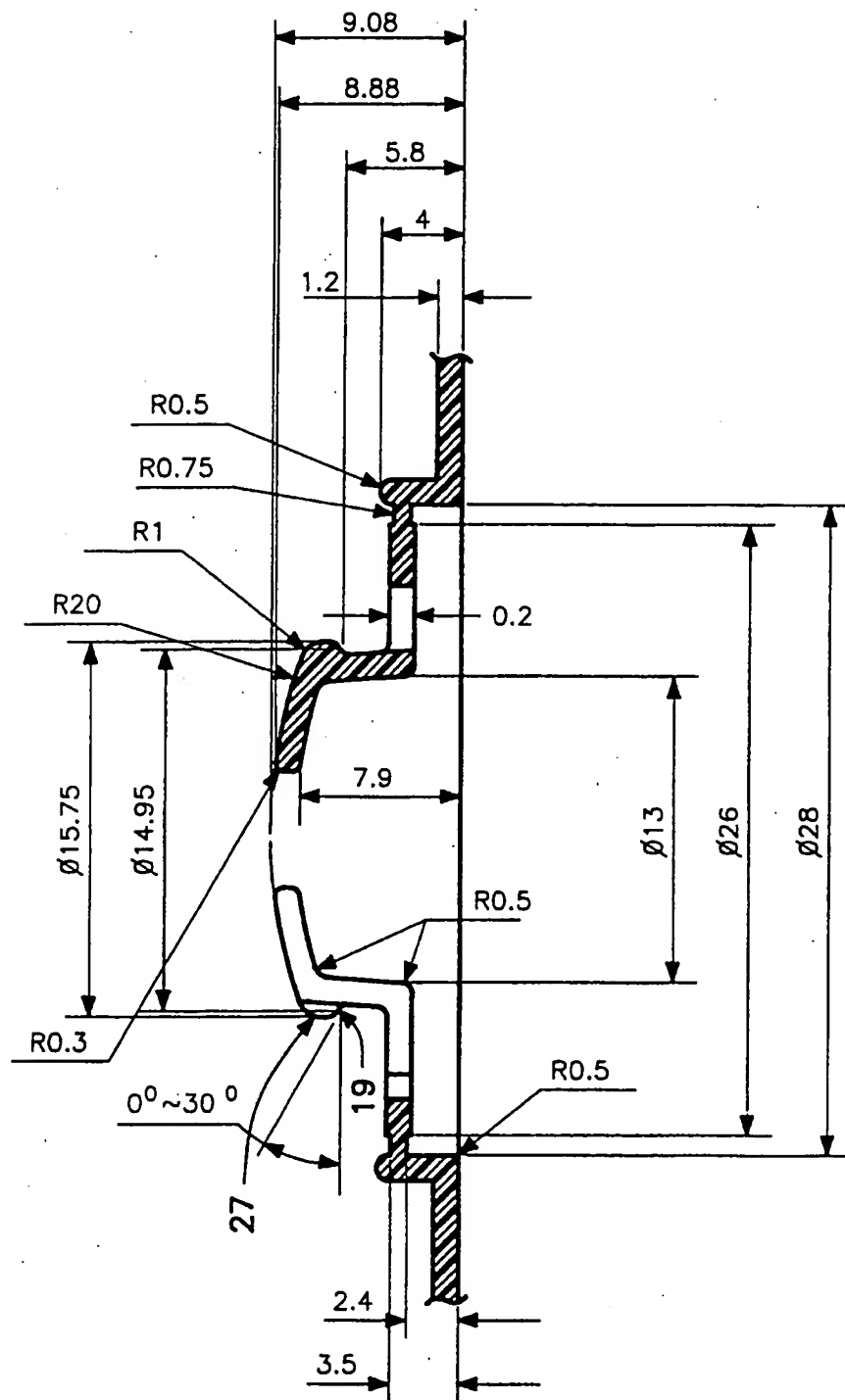
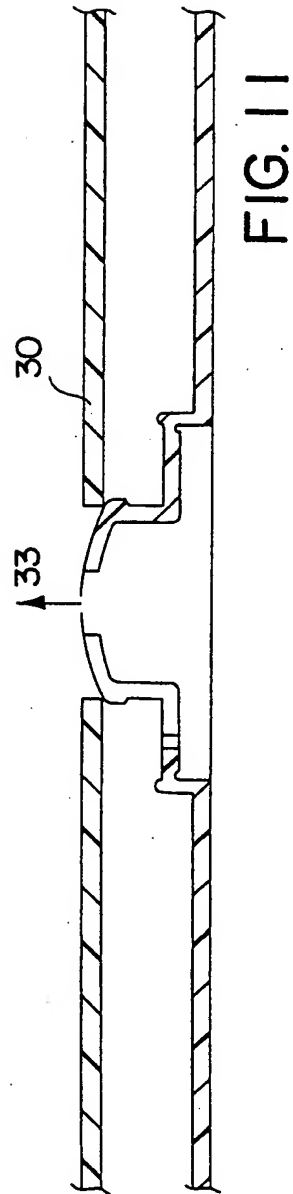
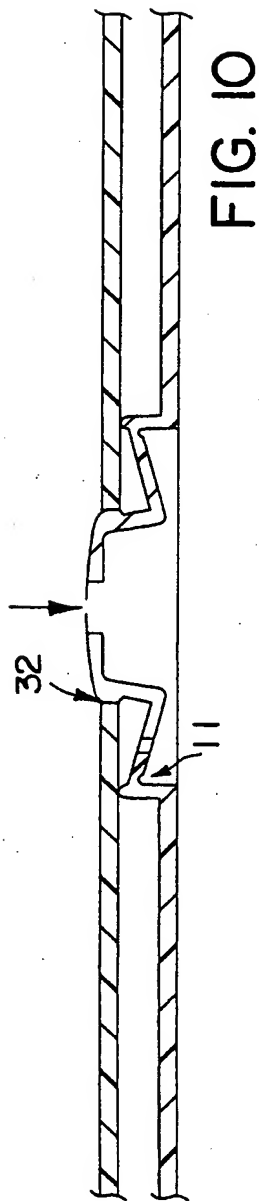
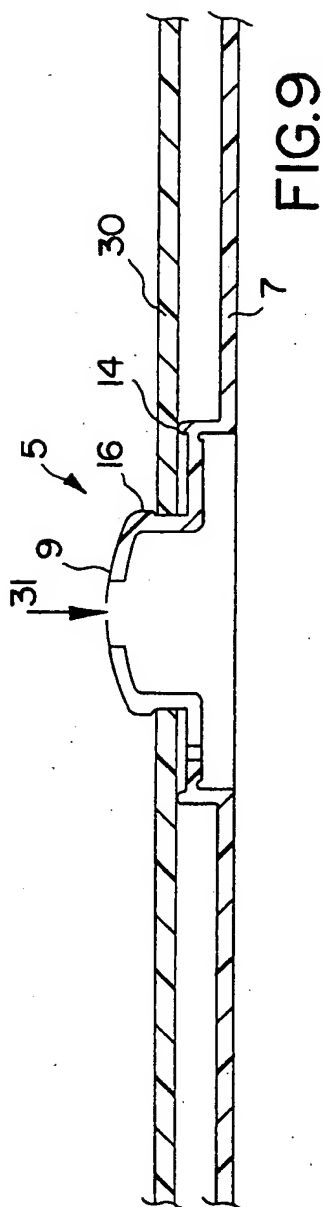


FIG. 8



INTERNATIONAL SEARCH REPORT

International Application No.

PCT/IB 00/01690

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G11B33/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G11B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	US 5 944 181 A (LAU KWOK DIN) 31 August 1999 (1999-08-31) abstract; figures 2-9 column 4, line 17 -column 5, line 50 ---	1,5,6
A		2-4,7
X	US 5 685 427 A (ANDERSON STEVEN R ET AL) 11 November 1997 (1997-11-11) abstract; figures 1-3,6-10 column 2, line 60 -column 3, line 39 column 3, line 57 -column 4, line 36 --- -/-	1,5,6



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents:

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Date of the actual completion of the international search

29 January 2001

Date of mailing of the international search report

06/02/2001

Name and mailing address of the ISA

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INTERNATIONAL SEARCH REPORT

International Application No

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